CALCULUS.

126. Proposed by JOHN M. COLAW, A. M., Monterey, Va.

Find the volume contained between the conical surface whose equation is $z=a-\sqrt{(x^2+y^2)}$, and the planes whose equations are $x=z$ and $x=0$ by the formula $\int\int\int dxdydz$. [*Todhunter's Integral Calculus.*]

127. Proposed by J. A. CALDERHEAD, B.Sc., Professor of Mathematics, Curry University, Pittsburg, Pa.

Find the moment of inertia of a parallelogram about an axis perpendicular to its plane and passing through the intersection of its diagonals.

*** Solutions of these problems should be sent to J. M. Colaw not later than May 10.

MECHANICS.

115. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

A vessel in the shape of a parallelopiped, filled with water, has in its horizontal bottom a rectangular opening, whose dimensions are a and b, which is shut up by a slider. Supposing this slider to be opened with a uniform motion in the direction of a. To find the depth of the water in the vessel after the time T at the moment when the slider has passed through the space a, a denoting the horizontal section of the water in the vessel.

116. Proposed by C. L. CHILTON, Greensboro, Ala.

Given, the shaft ABC attached at one end by a pivot to the piston-rod of an engine (at A) and the other to the crank of a wheel CDE (at C). The shaft moves through the distance of two feet in one second from A to B and at the same time turns the crank from C to E. The force propelling the shaft along the constrained course from A to B is 5760 pounds. The mass of the rod and wheel and friction being not considered, what would be the kinetic energy of the machine ? or the sum of the moment around O, the center of the wheel ?

117. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College Mechanicsburg, Pa.

How much lower must *one end* of a heavy uniform chain, wound round the circumference of a perfectly rough vertical wheel, hang than *the other end*, when the chain is on the point of motion ?

118. Proposed by M. E. ANDERSON, Minneapolis, Minn.

A closed steel cylinder of length L and diameter D is placed in a horizontal position. The cylinder is filled with water to a depth (a) from the lower side, the space above the water being filled with air at a pressure P_1 .

What work will be done against this increasing pressure, and against gravity, by a pump forcing water into this tank until the pressure has increased to P_2 ? Suppose the level of the water in the tank at the beginning to be the same as that of the reservoir from which the water is pumped.

*** Solutions of these problems should be sent to B. F. Finkel not later than May 10.